

**Photoproduction of  $J/\psi$  and high-mass dielectrons  
in Ultra-Peripheral Au+Au collisions at  $\sqrt{s_{NN}} = 200$  GeV by PHENIX**

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Relativistic heavy ions are copious sources of virtual photons. Ultra-peripheral heavy ion collisions (UPC) provide the possibility to study particle photoproduction in electromagnetic processes with an equivalent two-photon luminosity which is proportional to the fourth power of the nuclei atomic number ( $Z^4$ ). At RHIC energies, the heaviest vector meson accessible in gamma A interactions with heavy ions such as Au is the  $J/\psi$ . In addition, the strong electromagnetic fields can also excite the nuclei and lead to forward neutron emission with an approximate probability of 55%, allowing Zero-Degree-Calorimeter triggering on this process.

At RHIC energies, photoproduction of the  $J/\psi$  probes the gluon distribution function  $G_A(x, Q^2)$  in nuclei and vector meson dynamics in nuclear matter in an unexplored kinematic region (Bjorken- $x \sim 10^{-2}$ ). High-mass dielectron production allows a test of QED in a strongly interacting regime where the perturbative calculations are expected to break down. We report PHENIX studies on  $J/\psi$  and high-mass dielectron production in UPC Au+Au collisions at  $\sqrt{s_{NN}} = 200$  GeV tagged with forward neutron emission. Results are compared to various theoretical predictions and prospects for the future are discussed.